Potential Acceptance of Upcoming Thai Retail CBDC (Central Bank Digital Currency) in Thailand

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Abstract

Digital currency is being quickly adopted in Thailand. It has been claimed that Thailand is number 3 in the entire world, in which Thai people have adopted decentralized finance (DeFi) after the U.S. and Vietnam. Besides, the value of cryptocurrency trading has increased enormously – at least 17 folds – from 143 million USD in 2018 to 2489 million USD in 2020. Numerous central banks, including the Bank of Thailand (BOT), are paying attention to this wave of technology; as a result, CBDCs (Central Bank Digital Money), digital currency issued by each country's central bank and usable as cash, have been created by many central banks worldwide. However, due to their new arrival, CBDCs may be unfamiliar to Thai citizens and organizations. For this reason, it is worthwhile to investigate 1) the acceptance of retail CBDCs in Thailand and 2) the factors that may affect the acceptance of retail CBDCs in Thailand. Data was gathered using an online questionnaire conducted with 648 Thais who were familiar with the use of E-money. The data obtained were then subjected to binary linear regression analysis. Gender, employment, age, education level, income, media, and experience in using E-money were the independent variables whereas the adoption of Thai retail CBDC in the country was the dependent variable. Gender and E-money were the two-dummy factors. The results found two major independent variables that encourage the adoption of Thai retail CBDC; media and experience of using E-money. The greater the use of media, the more adoption rises. Adoption could even be greater when people have experience in the use of E-money. Nevertheless, other independent variables (gender, age, education level, and income) did not seem to influence the adoption. Recommendations were developed based on the results. The first is that the quantity of these media with high-quality content should be increased to raise Thai residents' awareness as media use leads to a greater adoption rate. Besides, since the E-money experience increases CBDC adoption, another suggestion is that E-money providers should encourage their consumers to embrace CBDCs by, for example, providing relevant CBDC information as part of their service.

Keywords: *Digital currency, CBDC, Digital economy, E-money*

1. Introduction

1.1 CBDC (Central Bank Digital Currency)

CBDC (Central Bank Digital Currency) is a digital currency that is issued by the central bank of each country, and the CBDC can be used in a similar way to cash. Based on the information from CDBC Tracker (2021), Thai CDBC is in the "proof of concept" stage today, and it is claimed that the main goals of the CBDC are as follows: "The BOT's main objective in exploring Retail CBDC is aimed at providing citizens with access to more convenient and secure financial services. In addition, the development of a Retail CBDC will support a technology-led future that is efficient and cost-effective and contribute to the development of more diverse and innovative financial services" (BOT, 2021a).

1.2 Types of CBDC in Thailand

According to the Bank of Thailand (BOT, 2021a), CBDC can be divided into two different types:

1) Wholesale CBDC, designed for interbank transfers or large value transfers by any institutions that hold accounts with the bank, and
2) Retail CBDC, designed for public use such as transfers from one person to another, payment for goods, and so on. This study will focus on the latter

Based on Figure 1, retail CBDC has fallen into the area of intersection between universally accessible, electronic, central bank-issued, and peer-to-peer. In other words, retail CBDC is meant to be issued by the central bank in an electronic form, which allows the retail CBDC to be accessed by the public as well as transferred among peers.

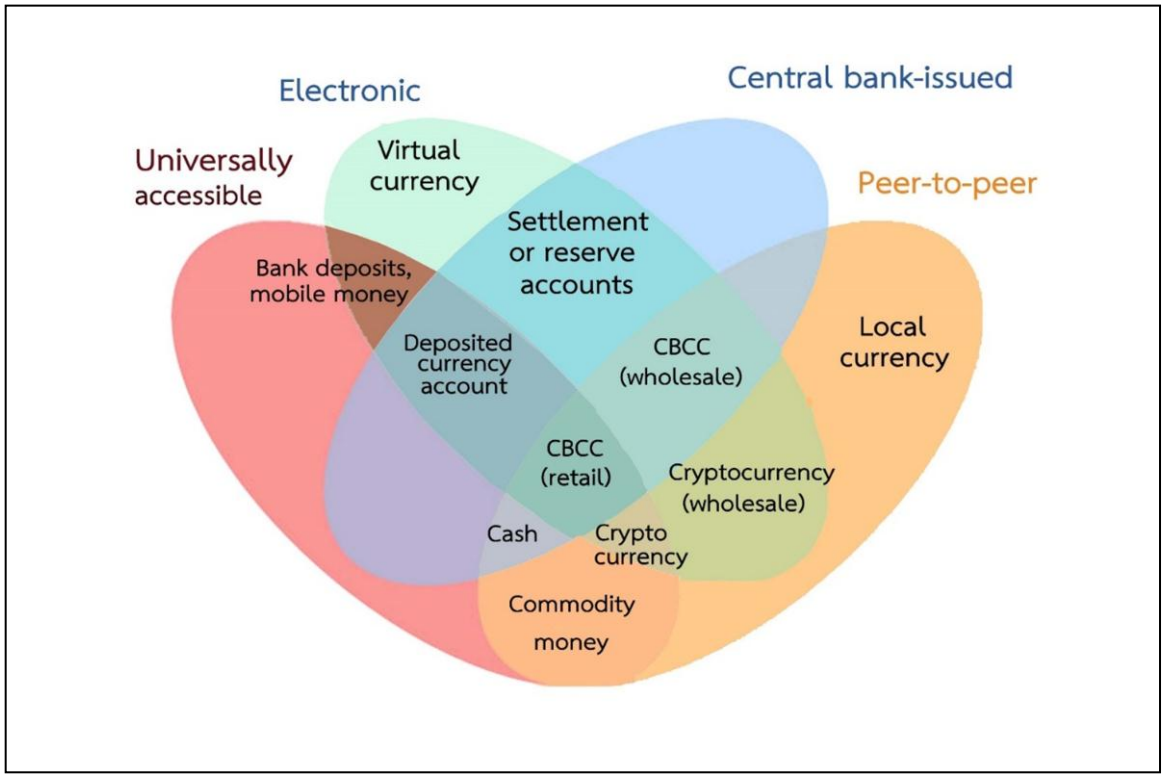

Figure 1 The money flower: A taxonomy of money (Bech & Garratt, 2017)

In addition, there are two development tracks of the CBDC (BOT, 2021b).

1) Foundation Track: Potentially the CBDC will start a pilot with limited scale use of CBDC with cash-like transactions, for example, sending, receiving, purchasing, and so on.
2) Innovation Track: The CBDC may come up with innovative solutions for further private/public sectors to plug the CBDC with their solutions. This will encourage the wide use of the CBDC itself.

1.3 Potential solution for retail CBDC

As described in Figure 2, Auer and Böhme (2020) elaborate on three high-level options.

Option 1 (Indirect CBDC): There will be banks acting as intermediaries between the central bank and end-users. The intermediaries conduct "know your customer" (KYC) and interact directly with end-users in terms of handling retail payments. In other words, the intermediaries' banks collect all transactional levels of retail payment. Technically, a lump sum of money will be delivered to the central bank probably by the end of the day.

Option 2 (Direct CBDC): The central bank conducts KYC directly with the CBDC end users. In addition, the central bank also manages retail payments straight to the end-users from its end.

Option 3: (Hybrid CBDC): This option looks like option 1. However, it seems that banks may or may not be there. The so-called "Payment Service Provider" (PSP) is represented instead in the diagram. The central bank will only sync up a copy of retail payments from its PSP.

Which option will be implemented in the Thai retail CBDC? There is no official announcement on that yet, but it seems that option 1 may be the preferred choice of the BOT, which is because there is still much active public or private banks. Option 1 looks close to the current design of retail payments in Thailand.

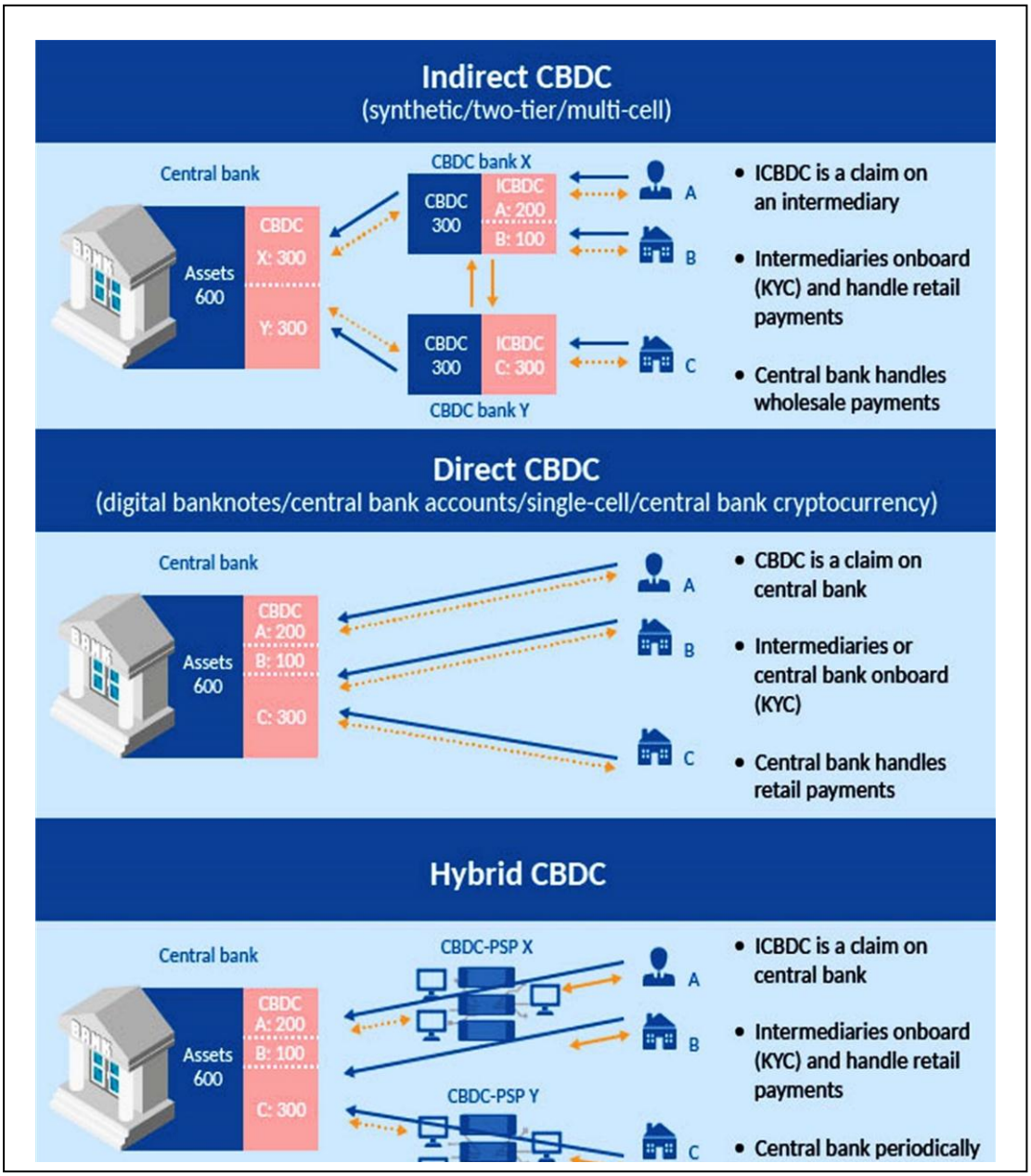

Figure 2 An overview of potential retail CBDC architectures (Auer & Böhme, 2020).

1.4 E-money in Thailand

E-money is another form of digital money that is being rapidly adopted in Thailand. Based on Table 1, the value of money spent via E-money has increased dramatically. It can be claimed that over 400% more E-money has been used in the year 2020 (over 300,000 million THB) compared to the year 2015 (around 67,000 million THB).

Table 1 An overview of E-money

	2020 r	**2019 r**	**2018 r**	**2017**	**2016**	**2015**
No. of cards/account (in million) 2/						
Bank	20.06	19.34	17.65	2.58	2.09	1.78
Non-bank	87.71	70.00	74.10	51.69	37.09	29.29
Grand total	107.77	89.43	91.75	54.27	39.18	31.07
Top-up value (Millions of baht)						
Bank	38,356.23	91,770.07	38,862.98	11,275.30	6,313.26	4,410.00
Non-bank	278,068.70	200,350.21	178,594.02	116,313.56	85,207.40	63,625.89
Grand total	314,424.94	292,120.28	217,456.99	127,588.86	91,520.66	68,035.89
Spending value (Millions of baht)						
Bank	33,154.87	77,395.31	29,946.22	10,652.40	6,399.30	4,286.42
Non-bank	276,395.98	198,921.47	173,528.99	115,519.47	84,606.87	63,330.15
Grand total	309,550.86	276,316.79	203,475.21	126,171.87	90,946.17	67,616.57

Note:

1) Data collected from electronic payment service providers, including banks, SFIs, and non-banks, under Payment Systems Act B.E. 2560 (2017)
2) Data including E-money that is used in place of cash to pay for goods and services, excluding pre-paid cards for mobile phones

Source: Adapted from *e-Money 1*, by BOT, 2021c, Bangkok, Thailand.

1.5 Digital currency in Thailand

Approximately 3.6 million Thai people own cryptocurrency, which is about 5.2% of the total population (tripleA, 2021). This adoption rate is potentially showing an upward trend. In the year 2020, Thailand granted 13 cryptocurrency service providers (Bitcoin.com, 2020). In other words, cryptocurrency adoption in Thailand will become more widespread. Because Thailand has become a cashless society in recent years (Limsakul & Kraiwanit, 2020; Kraiwanit & Limsakul, 2021), this study is expected to contribute to the development of studies of CBDC, another form of cashless technology, in Thailand by providing useful findings and recommendations.

Table 2 Comparison of Thai retail CBDC, E-money, and cryptocurrency

Thai retail CBDC	**E-money**	**Cryptocurrency**
Issued by BOT	Issued by banks/non-banks	Issued by a company or private sector
Centralized and potentially mixed technology (hybrid) between centralized and distributed ledger technology (DLT)	Centralized as the BOT prints out banknotes beforehand and the money is distributed to public/private banks.	Decentralized and using blockchain technology
Supported by reserves	Supported by reserves	Not supported or partially supported by reserves or assets

Based on above Table 2, Libra is an example type of cryptocurrency and has now changed its name to become Deim (Kraiwanit & Limsakul, 2021). Besides other well-known cryptocurrencies such as Bitcoin and Ethereum, the newly emerging Deim has been developed by Facebook because Facebook has realized that there are many people worldwide who are still able to access financial services via traditional banks (Tarathonrungreung & Pattanarangsun, 2021).

During the research, several countries started the development and piloting of CBDCs. The common fundamentals of CBDC acceptance are similar: financial privacy, security, performance expectancy, and convenience of use.

1.6 Financial Privacy

Financial privacy is crucial in CDBC usage as it is under the control of the government. Personal financial statements can be recorded and retried in the "Distributed Ledger Technology or DLT." In other words, the government can access the information. Atako and Nerrnda (2021) stated that the accomplishment of the CBDC rollout relies on a revised privacy framework along with technological advancements. Ali and Narula (2019) also mentioned that the CBDC issue is clearly involved surveillance from the government.

1.7 Security

The security of using CBDC is another concern. The current design of banks is based on centralization; DLT, on the other hand, exposes the centralized database, which brings new security concerns. Kiff et al. (2020) stated that DLT platforms store multiple copies of databases across nodes and this is enabled the difficulty level of malicious attempts to crack the data.

1.8 Performance

Considering performance expectations, the research of Bijlsma et al. (2021) showed that 11% of the total of 2523 respondents were concerned about the speed of CBDC. CBCD savings accounts should do better than current savings accounts provided by banks.

1.9 Convenience

The convenience of using CBDC is another concern. Pichler et al. (2020) stated that cash is easy and convenient to use and is physically available to people who may not have access to mobile or electronic devices, for example, the accessibility of CBDC may be offered in a similar way to E-money such as in the form of a card. Jiang (2020) stated that CBDC could be designed in the form of debit and credit cards. In addition, the central bank can provide free devices to the public as well.

2. Objectives

1) To study the acceptance of retail CBDC in Thailand
2) To investigate the factors that may impact the acceptance of retail CBDC in Thailand

3. Materials and Methods

To conduct research on Thai retail CBDC from the viewpoint of Thai cryptocurrency traders, the researcher created a questionnaire following a review of the concepts and theories related to research used in quantitative analysis. The sample size of 648 was collected and focused on the population that is familiar with the usage of E-money. This was because the characteristics of either retail CBDC or E-money would be very similar from the point of view of end-users. The online questionnaire, a tool of this study, was developed by interviewing two experts, and the topics covered included but were not limited to the following: the advantages and disadvantages of retail CBDC, the impact of retail CBDC on people in the

country, the risks of using retail CBDC, and adoption of retail CBDC in Thailand. The analysis of the potential acceptance of the upcoming Thai retail CBDC uses a binary linear regression model, which is due to use in any other classification where there are only two possible outcomes. Based on the collected data from 648 samples, the independent variables were gender, occupation, age, education level, income, media, and experience of E-money usage. The dependent variable is the adoption of Thai retail CBDC in the country. Gender and E-money are the two-dummy variables in this research analysis. The value of Gender = 0 referred to female where Gender = 1 referred to male. The value of E-money = 0 referred to "Never experiencing using E-money" whereas the value of E-money = 1 referred to "Having experience of using E-money."

4. Results and Discussion

4.1 Results

Table 2 Test of model's performance using all independent variables by the Omnibus Test

		Chi-square	Df	Sig.
Step 1	Step	484.316	7	0.010
	Block	484.316	7	0.010
	Model	484.316	7	0.010

The model uses the independent variables gender, occupation, age, education level, income in Thai baht (THB), media, and experience of using E-money. The Omnibus Test of Model Coefficients verified this model, as illustrated in Table 2. The result presents a chi-square is 484.316, with df equal to 7, and therefore a dependent variable can be explained by all independent variables at the significance level of 0.05.

Table 3 The model summary (using all independent variables)

Step	-2 Log likelihood	Cox & Snell R-Square	Nagelkerke R-Square
1	412.422	0.526	0.702

Note: Estimation terminated at iteration number 5 because parameter estimates are changed by less than .001.

Table 3 presents the pseudo R-square, the Nagelkerke R-square of the model. It shows that the model could explain approximately 70.2% of the variation in the result at the significant value of 0.05.

Table 4 Classification table for back-testing (includes all independent variables)

Observed			Predicted		
			Adoption of CBDC		Percentage Correct
			0	1	
Step 1	Adoption of CBDC	0	300	40	88.2
		1	39	269	87.3
	Overall Percentage				87.8

Note: The cut value is .500

In Table 4, the classification indicates that the model with all independent variables is able to predict the adoption of Thai retail CBDC with an accuracy rate of 87.8% in cases when there is a cut value of 0.500 or when the scope of acceptance is 50%.

Table 5 Variables in the model using all independent variables.

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1	Gender	0.381	0.267	2.035	1	0.154	1.463
	Occupation	-0.358	0.576	0.385	1	0.535	0.699
	Age	-0.064	0.285	0.051	1	0.822	0.938
	Education Level	0.096	0.272	0.123	1	0.726	1.100
	Income in THB	0.187	0.170	1.210	1	0.271	1.206
	Media	0.279	0.019	219.961	1	0.010	1.322
	E-money	1.999	0.821	5.937	1	0.015	7.384
	Constant	-4.814	1.331	13.073	1	0.010	0.008

Note: Variable(s) entered in step 1: gender, occupation, age, education level, income in THB, Media, and experience of using E-money.

Based on the survey's results, 51.4% are males and 48.6% are females. The age between 21 to 30 years old is the majority at 37.6%, which is 4% more than the age less than 20. In addition, the student is 63.4% which is presented as the dominant occupation. Education level at 64.2% is bachelor's degree and income are less than 10,000 THB is the majority at 37%. Lastly, 93.2% of the sampling used to experience the usage of E-Money.

Table 5 illustrates the significance level of each independent variable. It shows that a dependent variable (the adoption of Thai retail CBDC level) could be described by two significant independent variables, which are the media and E-money. The rest (Gender, Occupation, Age, Education Level, Income) are not significant. As a result, remodeling needs to be done and it will focus on the following: 1. Media and 2. Experience in using E-money.

The following tables present the new model, which illustrates the Omnibus Tests of Model Coefficients, and so on.

Table 6 Test of new model's performance using two independent variables by the Omnibus Tests

		Chi-square	df	Sig.
Step 1	Step	469.297	2	0
	Block	469.297	2	0
	Model	469.297	2	0

The new model uses only the independent variables; media and experience in using E-money. The Omnibus Test of Model Coefficients verified this model as illustrated in Table 6. The result presents a chi-square value of 469.297 with df equal to 2, and therefore, a dependent variable can be explained by all independent variables at the significance level of 0.05.

Table 7 The new model summary (using two independent variables)

Model Summary

Step	-2 Log-likelihood	Cox & Snell R-Square	Nagelkerke R-Square
1	427.441	0.515	0.688

Note: Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Table 7 presents the Pseudo R-square and the Nagelkerke R-square of the model. It shows that the model could explain approximately 0.688 or 68.8% of the variation in the result at the significance value of 0.05.

Table 8 Classification table for back-testing (includes two independent variables)

			Predicted		
	Observed		Adoption of CBDC		Percentage Correct
			0	1	
Step 1	Adoption of CBDC	0	292	48	85.9
		1	39	269	87.3
	Overall Percentage				86.6

Note: The cut value is .500

In Table 8, the classification indicates that the model with the mentioned two independent variables is able to predict the adoption of Thai retail CBDC in 86.6% of cases when there is a cut value of 0.500 or the scope of acceptance is 50%.

Table 9 Variables in the new model using two independent variables.

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1	Media	0.274	0.017	246.923	1	<0.01	1.316
	E-money	2.366	0.815	8.435	1	0.004	10.652
	Constant	-4.606	0.836	30.376	1	<0.01	0.01

Note: Variable(s) entered in step 1: media, E-money.

Hence, the interpretation can be explained as illustrated in Table 9 below:

- With the change in the Coefficient of the Media by 0.274, the adoption of the Thai retail CBDC will change in the same direction.
- With the change in the Coefficient of the E-Money by 2.366, the adoption of the Thai retail CBDC will change in the same direction.
- When there is an increase of 1 unit in the use of media, the adoption of the Thai retail CBDC will increase by 1.316.
- When there is an increase of 1 unit in the experience of using E-money, the adoption of Thai retail CBDC will increase 10.652 times.

From the results of the new model analysis presented, the use of media and E-money is definitely the main driver of the adoption of Thai retail CBDC.

4.2 Discussion

Based on the study by Bijlsma et al. (2021) on CBDC adoption by consumers in the Netherlands, the paper concludes that males are 12% more likely to use CBDC than females. Whereby our research outcomes showed that there are no differences in the adoption of CBDC in Thailand whether males or females. People aged above 35 years are less likely to get involved with CBDC compared to younger people (Bijlsma et al., 2021), which conflicted with this research's result. Our outcome clearly reveals that no matter elderliness, there is no discrepancy between age to the adoption of CBDC in Thailand. People who have higher education are 6% more likely to adopt it than those with less education (Bijlsma et al., 2021). In contrast, our result notices that even though the higher education of the samples, the adoption of CBDC in Thailand remains the same. In addition, people who have higher incomes are 7% more likely to use CBDC compared to those with lower incomes (Bijlsma et al., 2021). Opposite to our paper that the diversification of incomes does not present the impact of the adoption of CBDC in Thailand. Lastly, Bijlsma et al. (2021) stated that people who have heard about CBDC have a 6% higher intention to use it than people who have

never heard about it. This claim is the only one that is close to our research, however, our outcomes show that the adoption of CBDC in Thailand becomes increases when people use E-money which is not only just aware of it.

The results of research on the adoption of Libra by Limsakul and Kraiwanit (2020) and Kraiwanit and Limsakul (2021) showed an increase by 1 unit in the social network, age, occupation, savings, or knowledge score can improve the adoption level more or less.

On the other hand, our research result clearly indicated that the adoption of CBDC in Thailand only becomes greater when independent variables (media and experience of using E-money) grow. Especially, an increase of 1 unit in the experience of using E-money raises adoption by a factor of 10.652.

The different outcomes may be due to the different people of the research countries' backgrounds such as their economics, regulations, and so on.

5. Conclusion

The results of the research precisely expose that either the use of media or the experience of using E-money influences the adoption of Thai retail CBDC.

First, the use of media such as social network applications, newspapers, and television leads to a higher adoption rate. Therefore, the number of these media with high-quality content should be built to develop the awareness of Thai citizens. Famous YouTubers (or social media influencers), for example, could lead to a higher rate of adoption when the audience learns more about the CBDC and how it could soon help to speed up the development of the country's financial technology. For remote areas or older citizens, newspapers could be a solution. News of Thai CBDC can be highlighted together with the benefits of using it.

Second, citizens' experience of E-money has a significant impact on the adoption of CBDC. A 1-unit increase in experience of using E-money raises the adoption rate by a factor of 10.652, which is almost 10 times more than the impact of media. Once people are using E-money, they are more likely to use the CBDC as well. To increase awareness of the CBDC, E-money applications could inform their members or users about the CBDC, for example by explaining how secure the CBDC is and what innovations it will provide.

6. References

Ali, R., & Narula, N. (2019). Redesigning digital money: What can we learn from a decade of cryptocurrencies?. *MIT Media Lab*. Retrieved December 11, 2021, from https://static1.squarespace.com/static/59aae5e9a803bb10bedeb03e/t/5e28b4bca9d3422148400c95/1579726012763/Redesigning+digital+money_++What+can+we+learn+from+a+decade+of+crypto currencies_%281%29.pdf

Atako, & Nerenda, . (2021). Privacy beyond possession: Solving the access conundrum in digital dollars. *Vanderbilt Journal of Entertainment & Technology Law*, *23*(4). Retrieved December 11, 2021, from https://ssrn.com/abstract=3798838 or http://dx.doi.org/10.2139/ssrn.3798838

Auer, R., & Böhme, R. (2020). The technology of retail central bank digital currency. *BIS Quarterly Review*, 89. Retrieved December 11, 2021, from https://www.bis.org/publ/qtrpdf/r_qt2003j.pdf

Bank of Thailand. (2021a). *The way forward for retail central bank digital currency in Thailand*. Retrieved December 11, 2021, from https://www.bot.or.th/Thai/digitalcurrency/documents/bot_retailcbdcpaper.pdf

Bank of Thailand. (2021b). Retail central bank digital currency (Retail CBDC): Implications on the Thai financial sector and survey results. *BOT Press Release No.60/2021*. Retrieved December 11, 2021, from https://www.bot.or.th/Thai/PressandSpeeches/Press/News2564/n6064e.pdf

Bank of Thailand. (2021c). *e-Money 1*. Retrieved December 11, 2021, from https://www.bot.or.th/App/BTWS_STAT/statistics/ReportPage.aspx?reportID=694&language=en

Bech, M. L., & Garratt R. (2017). Central bank cryptocurrencies. *BIS Quarterly Review, September 2017*, 55-70. Retrieved December 11, 2021, from https://www.bis.org/publ/qtrpdf/r_qt1709f.pdf

Bijlsma, M., van der Cruijsen, C., Jonker, N., &Reijerink, J. (2021). What triggers consumer adoption of CBDC?. *De Nederlandsche Bank Working Paper No. 709*. doi: 10.2139/ssrn.3839477

Bitcoin.com. (2020). *Thailand has now licensed 13 cryptocurrency service providers*. Retrieved December 11, 2021, from https://news.bitcoin.com/thailand-licensed-13-cryptocurrency-service-providers/

CDBC Tracker. (2021). Thailand CBDC. Retrieved December 11, 2021, from https://cbdctracker.org/currency/thailand

Jakobson, L. (2021). *New study finds U.S. leads DeFi adoption*. Retrieved December 11, 2021, from https://coinmarketcap.com/alexandria/article/new-study-finds-u-s-leads-defi-adoption

Jiang, J.H. (2020). *CBDC adoption and usage: Some insights from field and laboratory experiments (No. 2020-12)*. Ontario, Canada: Bank of Canada.

Kiff, J., Alwazir, J., Davidovic, S., Farias, A., Khan, A., Khiaonarong, T., Malaika, M., Monroe, H., Sugimoto, N., Tourpe, H., & Zhou, P. (2020). *A survey of research on retail central bank digital currency.* IMF Working Paper.

Kraiwanit, T., & Limsakul, A. (2021). Adoption of Libra as a digital currency in Thailand. In B. Akkaya, K. Jermsittiparsert, & A. Gunsel (Ed.), *Handbook of Research on Current Trends in Asian Economics, Business, and Administration* (pp. 148-169). IGI Global. doi:10.4018/978-1-7998-8486-6.ch008

Limsakul, A., & Kraiwanit, T. (2020). Libra as a digital currency and its impacts on the Thai economy. *AU EJournal of Interdisciplinary Research*, 5(2). Retrieved December 11, 2021, from http://www.assumptionjournal.au.edu/index.php/eJIR/article/view/4807

Pichler, P., Summer, M., & Weber, B. (2020). Does digitalization require central bank digital currencies for the general public?. *Monetary Policy & the Economy, 4*, 40-56.

Tarathonrungreung, J., & Pattanarangsun, P. (2021). Factors affecting the interest in using Libra cryptocurrency. *Journal of Business, Economics and Communications, 16*(2), 107-122. Retrieved December 11, 2021, from https://so02.tci-thaijo.org/index.php/BECJournal/article/view/241675

tripleA. (2021). Cryptocurrency information about Thailand. Retrieved December 11, 2021, from https://triple-a.io/crypto-ownership-thailand/

Chainalysis (2021). Introducing the Chainalysis Global DeFi Adoption Index. Retrieved October 14, 2021, from https://blog.chainalysis.com/reports/2021-global-defi-adoption-index/